as well as the fruit, and I think also on the branches. It is by no means confined to Indiana, or rare in any peach district in the United States. It is common along the Atlantic, in the region of the Great Lakes, in the Lower Mississippi Valley, and in California. In Maryland and Delaware it has been known for many years, and is so abundant that its presence is regarded as a matter of course. The choice early peaches and the middle varieties are little subject to it, but Smocks and nearly all late and inferior sorts are more or less spotted. So constant is this spotting that many peach-growers have come to consider it as *characteristic* of certain varieties and have no idea that it is abnormal.

It injures the appearance of the fruit somewhat, and when very abundant the flavor also, unless I have been much deceived. Growers do not generally regard it as a serious evil, or indeed as a matter of any consequence. The loss in late sorts with firm flesh is nevertheless sometimes very considerable. So far as my own observation goes this results principally from cracking and rot, in much the same way as in apples and pears when badly attacked by *Fusicladium*. The half-grown peach forms a protective layer of cork beneath the most thickly spotted surface. This cork layer is incapable of further growth and is ruptured in deep irregular fissures when the peach rapidly enlarges during the last few days of its growth. The spores of *Monilia fructigena* Pers. fall upon this exposed surface and rot begins immediately. The cracking appears to be worse in rainy weather, which is also the most favorable condition for the rapid development of the rot. In September, 1888, in the great peach region of Maryland and Delaware (the north part of the peninsula) fully one-half of the Smock peaches, aggregating many thousand baskets, were lost by rot during a rainy week. Cracking of the fruit often preceded this rot and was due in part to *Cladosporium*. Nevertheless the loss would have been inconsiderable but for the presence of this other much worse parasite—the rot fungus.

In 1886 and 1887, two very rainy seasons *Cladosporium carpophilum* was abundant in Maryland and Delaware, and I am therefore inclined to think that dry seasons are not specially favorable to its growth.

EXPERIMENTS IN THE TREATMENT OF GOOSEBERRY MILDEW AND APPLE SCAB.

Prof. E. S. Goff, of the New York Experiment Station, has kindly furnished us with the results of his experiments in the treatment of these diseases in 1888, which we give in full below:

POTASSIUM SULPHIDE FOR THE GOOSEBERRY MILDEW.

At the suggestion of Dr. J. C. Arthur,* formerly botanist to the

* For results secured with this substance by Dr. Arthur in 1887, see Report New York Agricultural Experiment Station, 1887, pp. 248–252.

station, a series of trials was made with potassium sulphide (liver of sulphur) as a preventive of injury from the disease of the gooseberry plant commonly known as "mildew," and due to a fungus parasite known to science as *Sphærotheca mors-uvæ* B. & C. The substance was applied in solution at the rate of one-half and one-fourth ounce to the gallon, respectively, commencing May 3, or as soon as the leaves had begun to expand, and the application was repeated after every hard rain until June 24, nine sprayings having been made in all. The experiment was made upon a row of the Industry gooseberry containing five plants, and upon a plat of seedlings numbering 282 plants.

Toward midsummer the effect of the spraying became distinctly visible in the deeper green foliage and more rapid growth of the treated plants. On June 23 the two plants of the Industry gooseberry that received the sprayings were noted as being entirely free from mildew, with the exception of a trace of it observed on a single fruit, while the three not treated were quite badly affected. The fungus appeared as a downy coating near the ends of the new shoots, and also upon the berries. The new growth, as well as the crop of fruit, was very perceptibly greater on the treated plants. At this time the bed of seedlings had not been perceptibly attacked by the fungus.

On July 16, the seedling plants were found to be considerably affected, and an examination showed that in the row treated with the sulphide at the rate of half an ounce to the gallon, only one plant exhibited signs of mildew out of a total of 60—about 1.7 per cent; in the row treated at the rate of one-fourth ounce to the gallon 3 plants were affected out of 43—about 7 per cent.; while in 133 plants not treated, 15 were affected, or about 11.3 per cent.

As these plants were all seedlings from native varieties and are not all subject to mildew, these figures are only an indication of the effects of the treatment and not a proof, for I do not know how many plants in the treated rows would have been affected had the applications not been made. There could be no question, however, as to the benefits resulting from the treatment. As far as the plantation could be seen the sprayed rows were conspicuous for the richer green of their foliage; and the row receiving the stronger solution showed somewhat greater vigor than the other. A part of this benefit, however, probably resulted from the influence of the sulphide in destroying or repelling the currant worm, as the treated plants were noticeably less injured by this insect than the others. A part also may have resulted from the fertilizing effect of the potash applied.

In the latter part of summer, after the spraying had been discontinued, the mildew increased on the treated plants, showing clearly that the applications were beneficial, and also that they must be continued throughout the growing season to confer their greatest benefit.

SODA HYPOSULPHITE CONTRASTED WITH POTASSIUM SULPHIDE AND CALCIUM SULPHIDE FOR THE APPLE SCAB.

In former reports are given the results of experiments with soda hyposulphite for the apple scab, *Fusicladium dendriticum*, Fckl. From these it appears conclusively that this substance as used acted beneficially, but that it was not a complete remedy for this disease. It is very desirable that some substance be found that will prove more effectual in destroying this fungus without causing greater harm to the foliage. Two other compounds of sulphur, viz, potassium sulphide and calcium sulphide, were therefore tested the past season. The first trial was made with the potassium sulphide in solution, at the rate of half an ounce to the gallon, upon the crab-apple tree treated for three seasons preceding with soda hyposulphite, as described in the experiments cited.

The spraying, which was done with the so-called Little Gem force-pump, fitted with a "Climax" nozzle, was made upon the west half of the tree only, and was commenced May 10, just as the leaves were expanding, and repeated after every hard rain until July 24, eight applications having been made in all.

The tree blossomed alike, apparently, on both the sprayed and unsprayed portions, but the crop of fruit matured was much larger on the sprayed part, and, as the following figures will show, was of much better quality.

On September 12 a quantity of fruit was picked from the sprayed and from the unsprayed parts of the tree, and each lot assorted into three classes, in order to determine their relative injury from the disease. In the first quality were put only fruits nearly or quite free from scab; in the second those that were considerably scabby, but not so much as to distort their form or prevent them from acquiring their normal size, and in the third those which were distorted in form or diminished in size by the growth of the fungus.* The results secured as follows:

	Number of fruits examined.	Per cent. in first quality.	Per cent. in second quality.	Per cent. in third quality.
Sprayed part	1,560	75.9	22.6	1.5
Unsprayed part	627	46.9	45.3	7.8

More than 627 fruits did not mature on the unsprayed part of the tree. On the sprayed part, however, many more might have been gath-

* This classification is necessarily somewhat arbitrary, but, as the assorting was done with care, it is believed that the figures represent the true proportions of the amount of injury wrought by the scab. Almost all the fruits were somewhat scabby in the cavity about the stem, but if not affected elsewhere, this did not exclude them from the first quality.

ered. If we ascribe the larger crop on the sprayed part to the influence of the application, it is evident that the figures express but a small part of the benefit resulting from the treatment. Aside from the difference in crop, the fruits on the unsprayed portion were inferior in size to those on the other part.

A comparison of the results secured the past season with potassium sulphide with those secured on the same tree in 1885 and 1887 with soda hyposulphite would indicate that the former proved the more effectual. Such a comparison, however, may not be just.

In a second trial, ten trees of the Fall Pippin apple were treated as above described, with solutions of three compounds of sulphur, viz: Soda hyposulphite, at the rate of half an ounce to 10 gallons; potassium sulphide, half an ounce to the gallon; and calcium sulphide in a saturated solution, the spraying in every case being made on the same day and in the same manner. The trees were divided into three series, the second, fifth, and ninth forming the second, and the third, sixth, and tenth the third series. The first sprayings were given June 5, by which time the leaves were well expanded. Other sprayings were made June 16, June 27, and July 2, each of which shortly succeeded a hard rain.

On September 21 the fruits on the sprayed and unsprayed portions of each of the ten trees were picked, with the exception of a belt about 3 feet wide across the center of the trees where the sprayed and unsprayed parts were supposed to meet. The apples were then assorted into three qualities, as described in the case of the crab apple tree, with the following results:

	Number of fruits examined.	Per cent. in first quality.	Per cent. in second quality.	Per cent. in third quality.
First series—Soda hyposulphite:				
Sprayed part	495	56.56	27.91	16.43
Unsprayed part	397	46.85	27.96	25.19
Per cent. in favor of sprayed part		9.71		8.76
Second series—Potassium sulphide:				
Sprayed part	960	31.35	40.11	28.54
Unsprayed part	247	22.67	36.03	41.30
Per cent. in favor of sprayed part		8.68		12.76
Third series—Calcium sulphide:				
Sprayed part	315	28.26	40.95	30.79
Unsprayed part	129	37.21	33.33	29.46
Per cent. in favor of unsprayed part		8.95		.67

From this trial it does not appear that the potassium sulphide was decidedly more effectual than the soda hyposulphite, although as applied it contained about fifteen times as much sulphur. The soda hyposulphite injured the foliage somewhat, and evidently could not be safely used in a stronger solution.

The calcium sulphide apparently did no good whatever. This substance is only very sparingly soluble in cold water, which may account

for its inaction. The fact that the sprayed part, when treated with this substance, showed so much greater percentage of injury than the unsprayed throws a possible doubt over the whole trial, for we can not suppose that this compound of sulphur could have favored the growth of the fungus.

The results of these tests appear to warrant the following conclusions:

First. That soda hyposulphite and potassium sulphide, as applied, proved beneficial in preventing injury from the fungus. This conclusion is strengthened by the results secured in previous experiments already cited.

Second. The tests do not prove that the greater amount of sulphur added in the potassium sulphide as compared with the soda hyposulphite rendered this substance the more effectual, though there are indications in this direction.

Third. That calcium sulphide is of little or no value for the purpose used.

Fourth. That while further experiments are needed to furnish data from which we may compute the actual benefits conferred by the treatments, the indications are that the good accomplished was sufficient to warrant the slight cost of the materials in the case of orchardists who spray their trees for the codling moth.

NOTES.

By B. T. Galloway.

SULPHURET OF POTASSIUM FOR BITTER ROT OF THE APPLE.

Judging from the reports received bitter-rot of apples (*Glœosporium fructigenum*) is on the increase. Last year (1888) Mr. J. W. Beach, of Batavia, Ark., made some experiments with the view of finding a remedy for this disease which are not without interest. We wrote Mr. Beach early in March, 1888, requesting him to spray the fruit five or six times during the season with a solution of sulphuret of potassium, one-half an ounce of the potassium to the gallon of water. In accordance with our instructions the first application was made when the apples were about one inch in diameter, and the Lewis Combination Force Pump was used for the purpose. The second application was made three weeks later, and was followed by a third in about a month. Up to the time of the third application very little rot had appeared on the sprayed apples, while those not sprayed rotted badly. Unfortunately at this time the supply of the fungicide became exhausted and nearly two months elapsed before enough was obtained to make the fourth application. During this interval much of the sprayed fruit which had hitherto remained healthy fell a prey to the disease, and, in spite of all treatment, this continued until the fruit was harvested. Mr. Beach, however, has full confidence in the remedy and says that during the